CASE REPORT Open Access

Furcation management: a viable surgical for apical migration of the gingival margin on mandibular molar

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Abstract

Furcation involvement (FI) poses significant challenges in periodontal management due to anatomical complexities and limited accessibility for cleaning, often resulting in the progression of periodontal diseases if not properly addressed and treated. This case report presented a 50-year-old male patient with gingival recession and FI in the left mandibular molar, tooth 36. A furcation plasty (FP) procedure was performed under local anaesthesia, involving incision and flap reflection, exposure and debridement of the furcation area, and apical repositioning of the flap to facilitate plaque control and reduce disease progression risk. Post-operative healing was satisfactory, with no signs of inflammation observed at the two-week follow-up. Supportive periodontal therapy (SPT) was implemented to maintain long-term satisfactory clinical outcomes. This case highlights the efficacy of FP as a treatment modality for FI, emphasising the significance of meticulous and proper case selection.

Keywords: *apical migration, furcation plasty, gingival recession, molar*

Received:
22 July 2025
Revised:
10 September 2025
Accepted:
3 November 2025
Published Online:
28 February 2026
How to cite this article:
Abdul Aziz, A. A. A., Ahmad, A. A., Sabarudin, M. A., Mohd Hanifah, M. H., & Roslan, U. (2026). Furcation management: a viable surgical for apical migration of the gingival margin on mandibular molar. *IIUM Journal of Orofacial and Health Sciences*, *7*(1), 100–105. https://doi.org/10.31436/ijohs.v7i1.432
Article DOI:
https://doi.org/10.31436/ijohs.v7i1.432
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Introduction

Gingival recession is the apical migration of the gingival margin, leading to the exposure of the root surface, which can cause aesthetic concerns, hypersensitivity, and increased susceptibility to root caries and non-carious cervical lesion. It typically progresses gradually and is most common in individuals over 40 years old. It is commonly associated with factors such as periodontal disease, aggressive tooth brushing, occlusal trauma, and anatomical factors, including a thin gingival biotype and malpositioned teeth (Kassab & Cohen, 2003).

According to the National Health and Morbidity Survey (NHMS) 2020, nine out of ten of the Malaysian population suffer from periodontitis, with 14.5% of them observed with deep pockets (NOHSA, 2020). As it involves multi-rooted and furcation areas, treatment modalities pose additional challenges to the clinicians. This may be due to restricted access to the area and challenging morphology, which reduce the effectiveness of both non-surgical and surgical treatments and hinder the patient's ability to control plaque through self-care (Chiu *et al.*, 1991).

Notably, periodontitis involving the furcation area will increase the risk for tooth loss if the disease progresses and exhibits vertical and/or horizontal patterns of destruction (Dannewitz *et al.*, 2016). Accordingly, non-surgical periodontal therapy (NSPT) can be an option for managing periodontitis with furcation involvement (FI). However, according to Nibali *et al.*, (2016), the risk for FI doubles on molars when maintained under supportive periodontal therapy (SPT) (Nibali *et al.*, 2016). Therefore, furcation plasty (FP) can be considered as an option for furcation-involved molar management (Rasperini *et al.*, 2020).

Case report

A 50-year-old Chinese male patient was referred, complaining of discomfort on the lower left side without any other signs and symptoms. It was only after eating due to food impaction. He claimed to be healthy with no drug allergy. He was a symptomatic dental attendee with no history of smoking and a non-alcoholic person. He brushed his teeth once per day and used a water spray, seldom using the floss.

Intraorally, he had moderate oral hygiene, with calculus observed in the lower lingual anterior and molar areas. He also had generalised bleeding on probing with no deep pocketing detected (Table 1), and the highest Basic Periodontal Examination (BPE) score was 3 with FI. In particular, the tooth involved was tooth 36, which presented with recession, Miller Class I and mobile Grade I. Due to no response to pulp sensibility test and presence of periapical lesion, the tooth was diagnosed with previously initiated therapy with asymptomatic apical periodontitis and underwent root canal treatment and was restored with an all-ceramic crown (Figure 1).

The gingival recession with plaque accumulation involved 4 mm of furcation area on tooth 36. Furcation entrance size < 0.5 mm. Note that the smallest interdental brush is unable to go in. Hence, further furcation management is required to prevent plaque accumulation, which may progress into caries formation (Figure 2). Correspondingly, FP therapy was planned since the furcation is grade I with clinical attachment loss of < 3 mm of the tooth and without aesthetic concern. The patient was informed about the surgical procedures and complications, and consent was obtained.

Table 1. Six point periodontal pocket depth charting of tooth 36.

Six point periodontal pocket depth of tooth 36		
Mesiobuccal	**Midbuccal**	**Distobuccal**
4	5	4
Mesiolingual	**Midlingual**	**Distolingual**
4	4	4

Figure 1. Gingival recession of tooth 36 with furcation involvement.

Figure 2. Assessment of furcation using UNC-15 probe.

Incision and flap reflection (Figure 3A-E)

Local anaesthesia was given on tooth 36 for buccal infiltration and infra-alveolar nerve (IAN) block using mepivacaine hydrochloride acid 44 mg and adrenaline 22 µg. Internal bevel 1.0 mm away from marginal gingiva of tooth 36 was done. Releasing incisions were made using 15c scalpel blade at distal and mesial away from the papilla of tooth 36. A full-thickness mucoperiosteal flap was raised, exposing the furcation entrance (white box). Meanwhile, a partial thickness mucoperiosteal flap raised the alveolar bone level (blue box).

Furcation plasty on buccal of tooth 36

Scaling and root surface debridement (RSD) on the furcation were performed. At the same time, marginal soft tissue and granulation tissue were removed. Moreover, FP was conducted with a flame-shaped bur.

Apical reposition flap

The flap was apically repositioned. A simple interrupted suture was performed with polyamide non-resorbable 5.0 to secure the distal and mesial flaps. Cross-sutured with non-resorbable silk 4.0 was made to adapt the flap.

Post-operative care and maintenance

The patient was provided with post-operative care instructions, including recommendations for pain management, oral hygiene practices, and follow-up visits. The surgical site and healing were reviewed after two weeks. Post-operative healing was uneventful and satisfactory at the two-week review, with no signs of inflammation and good tissue adaptation The patient was maintained on a strict SPT programme to ensure the long-term success of the procedure.

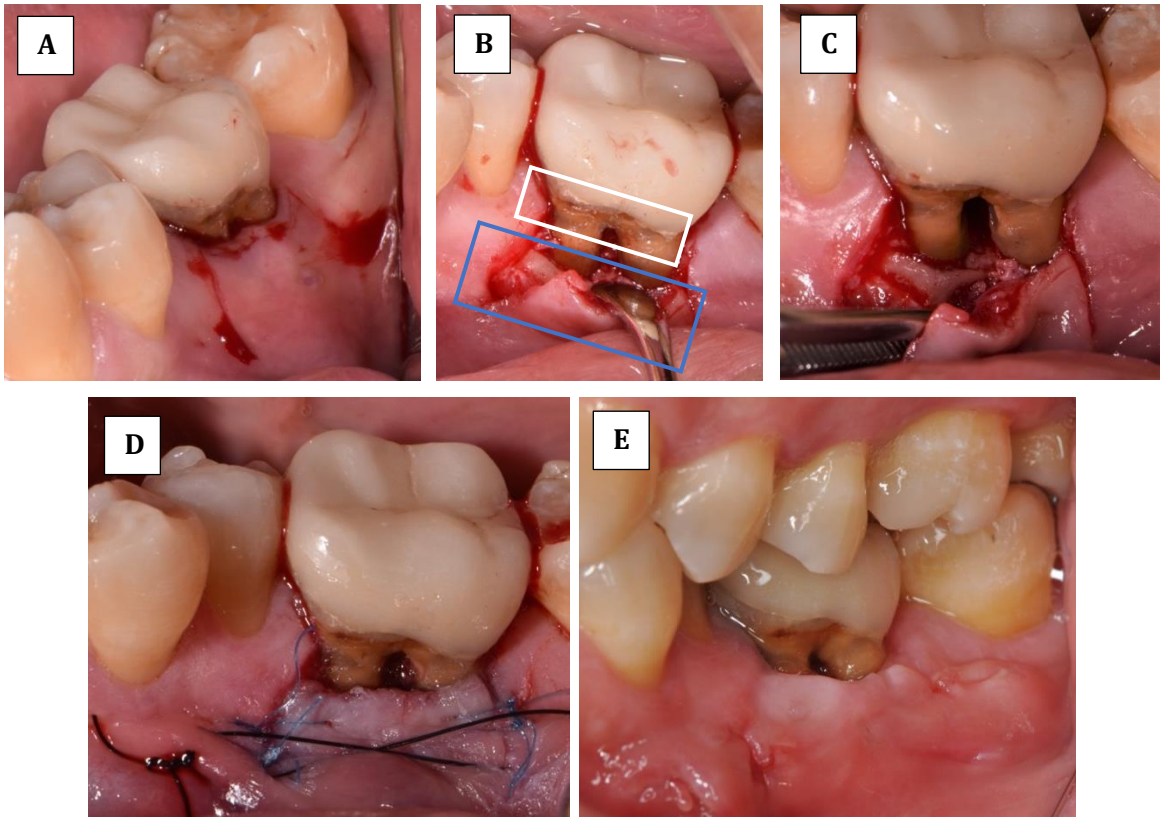

Figure 3. A: Access of tooth 36, B: Flap elevation, C: Debridement and furcation plasty, D: Apically positioned flap, E: Review after 2 weeks

Discussion

Furcation involvement is a condition in which periodontal disease progresses and leads to the loss of attached tissue surrounding the bifurcation and trifurcation area of multirooted teeth. It is mainly induced by the persistence of dental biofilm that may elicit a host inflammatory response.

The primary objective of this treatment was to enhance the patient's ability to maintain oral hygiene in a region affected by FI through FP. This aligns with Tonetti *et al.* (2017)'s vertical and horizontal subclassification system for furcation defects, which enables tailored decision-making in overseeing complex periodontal lesions (Reddy *et al.*, 2015; Tonetti *et al.*, 2022).

In the presented case, tooth 36 was presented with Miller Class I gingival recession with Grade I FI and minimal clinical attachment loss. Despite the Grade I classification, non-surgical management was deemed insufficient due to two key factors: 1) The extremely narrow furcation entrance (<0.5 mm) physically precluded access even for the smallest interdental aids (e.g., 0.4 mm brushes), rendering effective patient-performed plaque control impossible. 2) The associated gingival recession created a niche for plaque accumulation, presenting a significant risk for caries progression in the furcation area, which is notoriously difficult to restore." This clinical rationale follows the decision-making tree proposed by Reddy *et al.* (2015) from the AAP Regeneration Workshop, which recommends surgical access and defect modification (e.g., odontoplasty or osteoplasty) in early to moderate FI to create a maintainable architecture, especially when regenerative approaches are not feasible.

While NSPT remains essential in initial FI management, studies have demonstrated that molars with FI are at a significantly greater risk of tooth loss even under SPT.

Nibali *et al.* (2016) concluded that molars with FI had nearly double the risk of tooth loss compared to those without, highlighting the limitations of conservative approaches alone.

The use of FP, in this case, was deemed crucial as it enhances plaque control by removing soft tissue overhangs and recontouring the furcation area, thus improving access to professional debridement and patient self-care. Similarly, Bowers *et al.* (2003) emphasised that anatomical defects in molars, especially FI, negatively impact long-term tooth survival due to compromised oral hygiene access and plaque stagnation.

In cases where regeneration or tunnelling is contraindicated due to soft or hard tissue limitations, FP presents a viable alternative. In this case, this modality was guided by clinical findings, including the narrow entrance of the furcation (< 0.5 mm), mild vertical bone loss, and absence of aesthetic demands (Trombelli *et al.*, 2017). Moreover, careful case selection is critical for predicting treatment success based on gingival phenotype, amount of keratinised gingiva, root morphology, and patient motivation.

The long-term prognosis of teeth with FI undergoing surgical therapy is generally favourable if SPT is meticulously maintained. Tonetti *et al.* (2017) demonstrated that molars with Class II FI could be successfully preserved over time with adequate SPT and patient adherence. However, longitudinal studies are required to investigate long-term complications such as root sensitivity, re-infection, and cost-effectiveness of tooth retention versus implant replacement (Tonetti *et al.*, 2017).

Schwendicke *et al.* (2014) performed a cost-effectiveness analysis comparing molar retention strategies versus implants (Schwendicke *et al.*, 2014). The analysis demonstrated that when clinical outcomes were favourable, the preservation of molars via periodontal maintenance offered superior cost-effectiveness over time compared to replacement with dental implants (Schwendicke *et al.*, 2014). This underscores the therapeutic and economic justification for employing conservative surgical modalities such as FP in appropriately selected cases where anatomical and patient-related factors support long-term tooth retention.

A limitation of this case report is the short-term follow-up period. While initial healing was successful, the long-term efficacy of FP in preserving the tooth and facilitating hygiene can only be validated through sustained Supportive Periodontal Therapy (SPT) and monitoring over several years. Future follow-ups will assess parameters such as probing depth, attachment level, and patient-reported ease of cleaning.

Conclusion

In conclusion, FP serves to recontour anatomical defects and functions as a preventive strategy against progressive periodontitis and eventual tooth loss. It underscores the critical interplay between periodontal diagnosis, surgical planning, and patient compliance in sustaining long-term oral health outcomes. Nevertheless, a case must be carefully selected to ensure a better prognosis and prolonged tooth survival.

Acknowledgement

The authors wish to express their gratitude to the Faculty of Dentistry, Universiti Malaya, and Universiti Sains Islam Malaysia for their guidance, support, and resources throughout this research. Their contributions have been crucial in completing this case report.

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